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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/604,246

07/04/2003

Y. Y. Chang

10038-US-PA

1245

31561

7590

06/16/2004

JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE  
7 FLOOR-1, NO. 100  
ROOSEVELT ROAD, SECTION 2  
TAIPEI, 100  
TAIWAN

EXAMINER

HOGANS, DAVID L

ART UNIT

PAPER NUMBER

2813

DATE MAILED: 06/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/604,246

Applicant(s)

CHANG ET AL.

Examiner

David L. Hogans

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 27 May 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 8-14 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 8,9,11,12 and 14 is/are rejected.
- 7) ☒ Claim(s) 10 and 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

This Office Action is in response to the Election filed on May 27, 2004.

#### ***Election/Restrictions***

1. Applicant's election without traverse of Claims 8-14 in the reply filed on May 27, 2004, is acknowledged.

#### ***Status of Claims***

Claims 8-14 are pending. Claims 1-7 are cancelled.

#### ***Claim Objections***

2. Claim 10 line 5 is objected to because of the following informalities: line 10 appears to have an extra word: "comprise". Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 8, 9, 11-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over 6,521,496 to Roy et al. in view of 5,831,249 to Rohner et al.

#### **Claim 8**

Roy et al. teaches an RTA process (i.e. – noting that the process occurs at 1,000 °C, which is common to wafer annealing for implant damage/activation) comprising the following steps: loading a wafer into a reaction chamber of the first rapid thermal

annealing ("RTA") equipment; proceeding a hold temperature step (140) to maintain the reaction chamber at a first temperature; proceeding a first ramp up step (142) to ramp up the first temperature to a second temperature of the reaction chamber; proceeding a stable temperature step (144) to maintain the reaction chamber at the second temperature; proceeding a second ramp up step (146) to ramp up the second temperature to a main process temperature of the reaction chamber; processing a first RTA step (148) to the wafer by maintaining the reaction chamber at the main process temperature; and proceeding a cool down step (162, 164 or 166) to cool down the main process temperature to the first temperature of the reaction chamber. (See Figures 2 and 6 and columns 5-7 lines 65-58)

Roy et al. fails to explicitly teach comparing a measured value of an operation parameter with a reference range of value of the operation parameter; and proceeding a second RTA step to the wafer by maintaining the reaction chamber at the main process temperature when the measured value of the operation parameter is in between the reference range of value of the operation parameter.

However, Rohner et al., in Figure 4 and columns 5-8 lines 01-08, teaches comparing (step 80) a measured value ( $T_1$  or  $T_2$ ) of an operation parameter (i.e. – temperature) with a reference range of value ( $T_{\text{preset}}$ ) of the operation parameter; and proceeding a second RTA step (step 82) to the wafer by maintaining the reaction chamber at the main process temperature (i.e. – noting that Rohner et al. teaches

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completing the anneal cycle without mention of changing the temperature) when the measured value of the operation parameter is in between the reference range of value of the operation parameter.

It would have been obvious to one of ordinary skill in the art to modify Roy et al. by incorporating comparing a measured value of an operation parameter with a reference range of value of the operation parameter; and proceeding a second RTA step to the wafer by maintaining the reaction chamber at the main process temperature when the measured value of the operation parameter is in between the reference range of value of the operation parameter, as taught by Rohner et al., to provide for immediate detection of a device malfunction and prevent irreversible damage to a lot of wafers.

#### Claim 9

Incorporating all arguments of Claim 8 and noting that Roy et al. fails to explicitly teach wherein the first RTA equipment is turned off when the measured value of the operation parameter is out of the reference range of value of the operation parameter.

However, Rohner et al., in Figure 4 and columns 5-8 lines 01-08, teaches wherein the first RTA equipment is turned off (step 84) when the measured value of the operation parameter is out of the reference range of value of the operation parameter.

It would have been obvious to one of ordinary skill in the art to modify Roy et al. by incorporating wherein the first RTA equipment is turned off when the measured value of the operation parameter is out of the reference range of value of the operation parameter, as taught by Rohner et al., to prevent irreversible damage to a lot of wafers.

#### Claim 11

Incorporating all arguments of Claim 8 and noting that Roy et al. fails to explicitly teach wherein the operation parameter comprises a temperature measured by the pyrometer.

However, Rohner et al., in Figure 4 and columns 5-8 lines 01-08, teaches wherein the operation parameter comprises a temperature measured by the pyrometer (42).

It would have been obvious to one of ordinary skill in the art to modify Roy et al. by incorporating wherein the operation parameter comprises a temperature measured by the pyrometer, as taught by Rohner et al., to provide a reliable way to measure wafer temperature by optical emissivity.

#### Claim 12

Incorporating all arguments of Claim 8 and noting that Roy et al. fails to explicitly teach wherein the operation parameter comprises a power provided by the first RTA equipment.

However, Rohner et al., in Figure 4 and columns 5-8 lines 01-08, teaches wherein the operation parameter comprises a power (44) provided by the first RTA equipment.

It would have been obvious to one of ordinary skill in the art to modify Roy et al. by incorporating wherein the operation parameter comprises a power provided by the first RTA equipment, as taught by Rohner et al., to closely follow or track the temperature of a wafer.

#### Claim 14

Incorporating all arguments of Claim 8 and noting that Roy et al. fails to explicitly teach an operation temperature of the first RTA step and an operation temperature of the second RTA step, wherein the operation temperature of the first RTA step is equal to the operation temperature of the second RTA step.

However, Rohner et al., in Figure 4 and columns 5-8 lines 01-08, teaches an operation temperature of the first RTA step and an operation temperature of the second RTA step, wherein the operation temperature of the first RTA step is equal (noting that

Rohner et al. teaches completing the anneal cycle without mention of changing the temperature) to the operation temperature of the second RTA step.

It would have been obvious to one of ordinary skill in the art to modify Roy et al. by incorporating an operation temperature of the first RTA step and an operation temperature of the second RTA step, wherein the operation temperature of the first RTA step is equal to the operation temperature of the second RTA step, as taught by Rohner et al., because silicon wafers are normally annealed at a constant temperature of around 1,000 °C.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize the temperature, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233 (CCPA 1955)

#### ***Allowable Subject Matter***

5. Claims 10 and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter.



With regards to Claim 10, the prior art of record fails to explicitly teach, in combination with the other claimed features, wherein a second RTA equipment for the RTA process comprises, wherein unloading the wafer from the first RTA equipment and loading the wafer into the second RTA equipment after the first RTA equipment is turned off, in order to complete the RTA process of the wafer.

With regards to Claim 13, the prior art of record fails to explicitly teach, in combination with the other claimed features, wherein further comprises an operation time of the first RTA step and an operation time of the second RTA step, wherein the operation time of the first RTA step is less than the operation time of the second RTA step.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Hogans whose telephone number is (571) 272-1691. The examiner can normally be reached on M-F (7:30-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DH

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